GA 2812

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Assistant Commissioner for Patents
Washington, D.C. 20231

On Aug. 16, 2000

TOWNSEND and TOWNSEND and CREW LLP

By: G Silva

PATENT
Attorney Docket No.: 19705-000100US

#5





**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: | Examiner: A. Decady |
| **Bulent Dervisoglu et al.** | Art Unit: 2812 |
| Application No.: 09/275,726 | |
| Filed: March 24, 1999 | PETITION TO MAKE SPECIAL BECAUSE OF ACTUAL INFRINGEMENT (37 CFR §1.102 and MPEP §708.02) |
| For: ON-CHIP SERVICE PROCESSOR FOR TEST AND DEBUG OF INTEGRATED CIRCUITS | |

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicant hereby petitions to make this application special because of actual infringement.

Accompanying this petition are:

- **Statement by Attorney** In Support of Petition to Make Special Because of Actual Infringement;
- **Declaration of Bulent Dervisoglu** In Support of Petition to Make Special;
- **Supplemental Information Disclosure Statement** Under 37 CFR §1.97 and §1.98; and
- **PTO Form-1449** and copies of cited references.

**The Commissioner is authorized to charge the required fee of $130.00 to the undersigned's Deposit Account 20-1430 for this petition**, and to charge any additional fee or credit any overpayment relating to this petition to Deposit Account 20-1430. A duplicate of this petition is attached for accounting purposes.



Respectfully submitted,

Gary T. Aka
Reg. No. 29,038

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Two Embarcadero Center, 8th Floor
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Tel: (415) 576-0200
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PA 3089532 v1

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By: [signature]





PATENT
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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

**Bulent Dervisoglu et al.**

Application No.: 09/275,726

Filed: March 24, 1999

For: ON-CHIP SERVICE PROCESSOR FOR TEST AND DEBUG OF INTEGRATED CIRCUITS

Examiner: A. Decady

Art Unit: 2812

STATEMENT BY ATTORNEY IN SUPPORT OF PETITION TO MAKE SPECIAL BECAUSE OF ACTUAL INFRINGEMENT



Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

1. I am the attorney who prepared and filed the above patent application on behalf of the inventors, Bulent Dervisoglu, Laurence H. Cooke, and Vacit Arat.

2. I believe that there are infringing devices or products actually on the market, specifically, FPGAs (field programmable gate arrays) sold by Xilinx, Incorporated of San Jose, California, with a feature termed an "Integrated Logic Analyzer" core for testing and debugging the FPGAs. As support for this statement, I attach the accompanying Declaration of Bulent Dervisoglu In Support of Petition to Make Special (see Paragraphs 2 and 3) and the Exhibits accompanying that Declaration.

3. A rigid comparison of the alleged infringing Xilinx devices or products with the claims of the application has been made and, in my opinion, some of the claims are unquestionably infringed.

4. Furthermore, there appear to be other infringing devices or products actually on the market from ARM Technologies in Great Britain. These devices or products are ASICs (Application Specific Integrated Circuits) with microprocessor or microcontroller macrocells with a feature termed an "Embedded Trace Macrocell." As support for these statements I attach the accompanying Declaration of Bulent Dervisoglu In Support of Petition to Make Special (see Paragraph 4) and the accompanying Exhibits.

5. A rigid comparison of the alleged infringing ARM devices or products with the claims of the application has been made by inference from the described feature, and, in my opinion, I believe that some of the claims are infringed.

6. I have asked that a careful and thorough search of the prior art to be made (see Paragraph 5 in the accompanying Declaration of Bulent Dervisoglu In Support of Petition to Make Special) and the results of that search are submitted herewith in the accompanying Form PTO-1449 with a copy of each of the cited references.

Date: 8/16/00

By: Gary T. Aka
Gary T. Aka

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Assistant Commissioner for Patents
Washington, D.C. 20231

On Aug. 16, 2000

TOWNSEND and TOWNSEND and CREW LLP

By: [signature]



PATENT
Attorney Docket No.: 19705-000100US



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re application of: | Examiner: A. Decady |
| Bulent Dervisoglu et al. | Art Unit: 2812 |
| Application No.: 09/275,726 | |
| Filed: March 24, 1999 | |
| For: ON-CHIP SERVICE PROCESSOR FOR TEST AND DEBUG OF INTEGRATED CIRCUITS | DECLARATION OF BULENT DERVISOGLU IN SUPPORT OF PETITION TO MAKE SPECIAL |

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Bulent Dervisoglu, do hereby declare that:

1. I, along with Laurence H. Cooke and Vacit Arat, am the inventor of the subject matter of the patent application identified above.

2. I believe that there are integrated circuit devices on the market which infringe the claims of our patent application. One set of devices are FPGA's (field programmable gate arrays) sold by Xilinx, Incorporated (hereafter "Xilinx") of San Jose, California, with a feature termed an "Integrated Logic Analyzer (ILA)" core, for testing and debugging the FPGA's. I attach a printout of Xilinx web pages announcing this feature, as Exhibit A. In conjunction with this feature, on March 7, 2000 Xilinx made a joint announcement with Agilent Technologies, Incorporated of Palo Alto, California of a software

tool, termed "ChipScope," to exploit the Xilinx ILA core. The joint announcement is attached herein as Exhibit B.

3. Furthermore, I believe that these two companies created these FPGA's with the ILA core feature from the invention described in our patent application. At the end of 1999, an Agilent employee asked me for a copy of a paper which I had presented at the ITC'99 conference. The paper was based upon the invention described in our patent application. I gave the employee a copy of my paper and the slides which I had used at the ITC presentation.

4. I also believe that certain devices of another company, ARM Technologies in Great Britain, infringe the claims of our patent application. I base this belief upon the description of a feature, termed an "Embedded Trace Macrocell," announced for certain ASIC's (Application Specific Integrated Circuits), i.e., ARM9 and ARM7 Thumb Family devices. I attach a listing of the ARM microprocessor and microcontroller macrocells from the website of ARM Technologies and an ARM paper describing an integrated circuit debugging feature entitled "Real Time Debug", as Exhibits C and D respectively. The ARM paper references the Embedded Trace Macrocell.

5. I have also performed a search of the prior art of my patent application which I believe to be careful and thorough. The results of the search are submitted herewith in the accompanying Form PTO-1449.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 7/27/2000

By: B. Dervisoglu
Bulent Dervisoglu

# ChipScope ILA
**TM**

VIRTEX-E

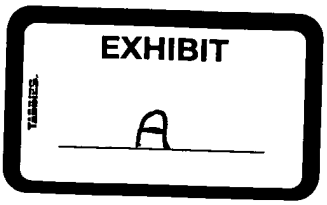


## Xilinx' ChipScope ILA for state-of-the-art logic Debugging and quicker design verification

Speed your verification cycles without using cumbersome external probing methods

**On-chip Logic Analysis is Key to Cutting Design Cycles**

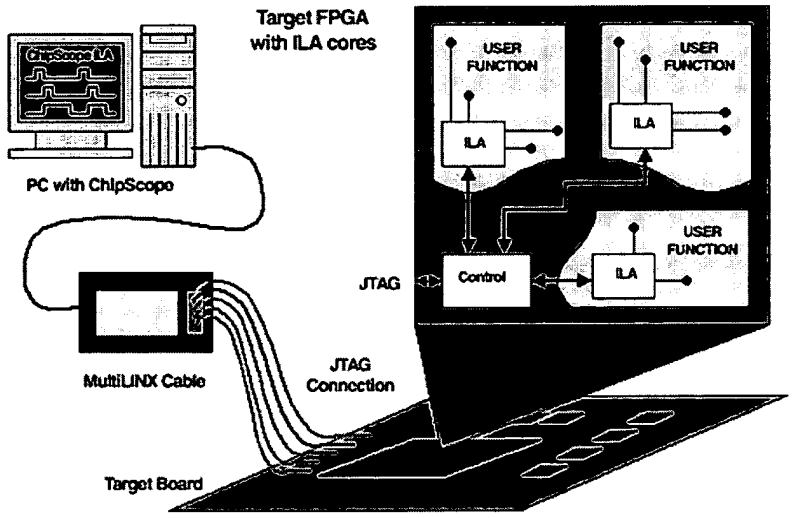
The need for thorough debugging capabilities in today's multi-million gate FPGA designs is critical. Verifying logic externally by probing package pins or board traces is becoming increasingly difficult. Using traditional methods, capturing traces on devices running at system speeds of >200MHz can be challenging. Ball grid arrays have rows of leads buried beneath the package that are inaccessible using conventional probing methods. Small, multilayer boards have lines buried deep within the epoxy that cannot be accessed using external tools and oscilloscope.



Attaching headers to aid in debugging can have adverse effects on system timing for high-speed busses, and consumes valuable PCB real estate. Since external access is no longer always possible, Xilinx has created a solution that integrates the verification capability into the silicon itself. ChipScope Software combined with the Integrated Logic Analysis (ILA) core allows real-time access to any node in the chip, with an easy-to-use GUI interface. With these powerful tools, designers spend less time verifying chip functionality and speed up their time-to-market. Today's complex devices and leadless packaging require on-chip logic analysis. Xilinx' ChipScope ILA facilitates real-time, on-chip de-bugging.

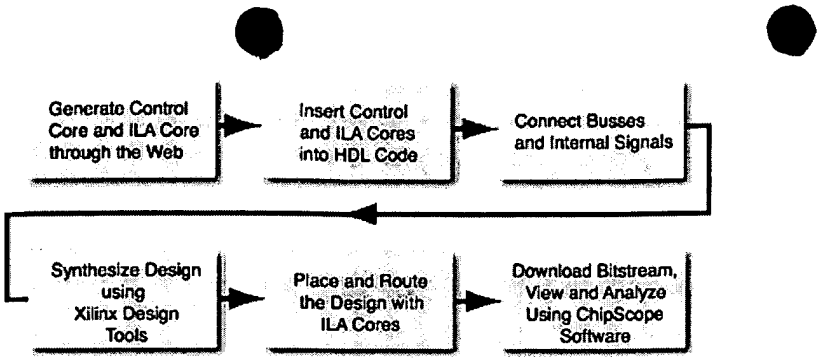
**Co-Developed with Agilent Technologies for Flexibility and Ease-of-Use**

The ChipScope software and ILA core were developed in partnership with Agilent Technologies, today's market leaders in logic analysis. The FBDF format output from ChipScope is compatible with the Agilent Technology 16700 series analyzer. Using ChipScope software and the ChipScope ILA core, designers have access to every internal node and the complete data bus at full system speed. Once the ILA core is integrated into the FPGA device, easy-to-use ChipScope software allows the designer to quickly download to the FPGA, modify trigger and set-up functions, and display waveforms for the captured traces. The ChipScope tools can be used with Virtex, Virtex-E and Spartan-II FPGA families.




**Integrated Logic Analyzer Block Diagram**

The components of the ChipScope suite include two soft cores; the integrated control core (ICON), which communicates to the dedicated JTAG pins, and the integrated logic analyzer core (ILA) that provides trigger and trace capture. ChipScope software allows set-up and trace display for the ILA core. A MultiLINX or Parallel Cable III download cable provides USB/RS232 interface for communication between the FPGA and the ChipScope tools.




**ChipScope ILA Flow**

The ILA and Control cores are generated through the web using a Java application. The cores are inserted into the design HDL code and connected to the internal busses and signals to be extracted. Then the design is synthesized and placed and routed using Xilinx' Foundation or Alliance series tools. The bitstream is downloaded, and can be analyzed through the ChipScope software.

**ChipScope ILA Tools are Powerful and Accurate**

ChipScope contains many features that Xilinx FPGA designers need to thoroughly verify their logic.. The number of data channels are user selectable from 1 to 256. The depth of the sample buffer ranges from 256 to 4096 samples, effectively doubling any FPGA logic analysis capability on the market today. Triggers are changeable in real-time without affecting the user logic. ChipScope software is easy-to-use and leads the designer through the process of modifying triggers and analyzing the data.

| ChipScope ILA Tools | |
|---|---|
| **Features** | **Benefits** |
| **User selectable data channels of 1 to 256** | **Accurately captures wide data bus functionality** |
| **User selectable sample size from 256 to 4096 samples** | **Large sample size increases accuracy and probability of capturing infrequent events** |
| **Separate bus trigger with user selectable width of 1-64 bits** | **Separate trigger bus reduces the need for sample storage** |
| **All data and trigger operations synchronous to user clock to 155 MHz** | **Capable of high speed data capture** |
| **Triggers are in-system changeable without affecting user logic** | **No need to signal step for stop a design for logic analysis** |
| **Can write waveforms to VCD and FBDF format** | **Compatible with Agilent Technologies and other waveform viewers** |
| **Easy to use graphical interface** | **Makes learning the software very easy, guides the user through selecting the correct options** |
| **Up to 15 independent ILA capture cores per device** | **Can segment logic and test smaller sections of a large design for greater accuracy** |
| **Multiple trigger settings** | **Records duration and number of events along** |

| | |
|---|---|
| | **with matches and ranges for greater accuracy and flexibility** |
| **Downloadable from the Xilinx Web Site** | **Software and cores easily accessed and downloadable via the Xilinx Xpresso Cafe.** |

## ChipScope Suite Additional Verification Tools

In the following months, additional verification tools will be available within the ChipScope suite. The Internal Performance Analyzer (IPA) core allows user to log and capture events. The integrated self-test module (IST) will provide self test capability at the device level. In addition to being available through the Xilinx Xpresso Cafe e-commerce site, the tools will be integrated into Xilinx' Foundation and Alliance series software.

**Order Now through Xilinx Xpresso Cafe**

Agilent

FOR IMMEDIATE RELEASE

# XILINX AND AGILENT TECHNOLOGIES COOPERATE TO IMPROVE FPGA DESIGNER PRODUCTIVITY

*New Xilinx ChipScope ILA tool enhances time-to-market advantage*

SAN JOSE, Calif., March 7, 2000—Xilinx, Inc. (NASDAQ:XLNX) and Agilent Technologies, Inc. (N today jointly announced the ChipScope Integrated Logic Analyzer (ILA) tool. This software tool, comb with the Agilent Technologies 16700 series logic analysis systems, allows Xilinx® field programmable array (FPGA) users to easily debug multimillion gate designs. The ChipScope ILA™ core can be integr into the actual FPGA design to provide real-time logic analyzer capabilities. The tools were developed i conjunction with Agilent, the leader in logic analysis tools. As a result, ChipScope ILA tool and the Ag 16700 series of logic analyzers are designed to be compatible for system-level debugging.

By combining these two powerful tools, designers spend less time debugging in-system chip functional improving their time-to-market. While the need for thorough debugging capabilities in multi-million ga FPGA designs remains, externally probing package pins or board traces is becoming increasingly diffic Using conventional logic analyzer probing methods to access leads in today's advanced ball grid techn or high-performance devices can be challenging. The Xilinx ChipScope ILA tool addresses these challe integrating logic analyzer capability into the FPGA. The Xilinx ChipScope ILA software and the ILA c allow real-time access to any node in the chip at full system speed, with an easy-to-use GUI interface. T ChipScope software allows designers to quickly download to the FPGA, modify trigger and set-up func and display waveforms for the captured traces. The Integrated Logic Analyzer data also can be displaye the Agilent 16700 Logic Analyzer, time correlated with other system data acquired by the 16700.

"Today's Internet-enabled world has product development windows shrinking at enormous rates," said J Sevcik, senior vice president of software, cores, and support at Xilinx. "Time to market advantages are more critical to the designers and to the success of their products. In many cases, today's logic designers first at which solution enables a shorter time to market. The existing FPGA time-to-market advantage combined with real-time logic analysis further shortens that critical development window."

The ChipScope ILA capability includes real-time trace capture and performs synchronously to the inter clock up to 155 MHz. Its capabilities double that of competitive logic analysis tools: it can process up t samples and 256 channels. Multiple trigger settings capture not only matches and ranges, but can recor duration and number of events. This gives the user a wide range of flexible options for complex events.

**Cooperative Effort with Agilent Technologies**

The Agilent 16700 series logic analyzers are the most widely used logic analyzers for system debug. Th combined with the Xilinx ChipScope ILA tool will enable a new debug paradigm in concurrent coordin FPGA and board-level system debugging.

EXHIBIT
B

"When two market leaders join efforts to deliver an integrated solution, their mutual customers succeed Pat Byrne, a general manager of the Electronic Products and Solutions Group in Agilent Technologies. "Multimillion-gate FPGA designers need state-of-the-art verification tools and many of those designers already Agilent customers. This was a natural fit to help our customer base get to market more quickly.'

Over the next quarter and in cooperation with Agilent, Xilinx plans to introduce additional verification applications to help high gate-count designers efficiently analyze FPGA logic and performance. These i ChipScope Integrated Performance Analyzer (IPA), which enables in-system performance monitoring f analysis of events, bandwidth, and transactions. Xilinx also plans built-in self test (BIST) for self-test capabilities at the device level.

**U.S. Pricing and Availability**

The ChipScope tool and the ILA core for Virtex™, Virtex-E and Spartan™-II FPGAs are now available download through the Xilinx Xpresso Café E-Commerce site and are available at the introductory price $195. The ChipScope IPA and ChipScope BIST modules are currently in beta testing and are expected available in second quarter. The tools also will be offered with high-density configurations of the Xilin Foundation Series™ and Alliance Series™ software.

Xilinx is the leading innovator of complete programmable logic solutions, including advanced integrate circuits, software design tools, predefined system functions delivered as cores, and unparalleled field engineering support. Founded in 1984 and headquartered in San Jose, Calif., Xilinx invented the field programmable gate array (FPGA) and fulfills more than half of the world demand for these devices tod Xilinx solutions enable customers to reduce significantly the time required to develop products for the computer, peripheral, telecommunications, networking, industrial control, instrumentation, high-reliability/military, and consumer markets. For more information, visit the Xilinx web site at www.xilir

Agilent Technologies, Inc. (NYSE: A) is a diversified technology company, resulting from Hewlett-Pac Company's plan to strategically realign itself into two fully independent companies. With 42,000 empl serving customers in more than 120 countries, Agilent Technologies is a global leader in designing and manufacturing test, measurement and monitoring instruments, systems and solutions, and semiconduct optical components. The company serves markets that include communications, electronics, life science healthcare. The businesses comprising Agilent, a subsidiary of HP, had net revenues of more than $8.3 in fiscal year 1999. Information about Agilent Technologies can be found on the Web at www.agilent.c

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# Technical Documentation for ARM Cores

The following ARM Technical Documentation is available to registered users in PDF format for viewing with the latest Adobe® Acrobat® Reader.

## Documents Available:

1. ARM9 Thumb Family
2. ARM7 Thumb Family
3. ARM7
4. Embedded Trace Macrocell
5. ARM PrimeCell Peripherals

If you experience any difficulties downloading a manual please contact us and report the problem (Web Issues).

## Processors and microcontrollers:

### ARM9 Thumb Family

| | # | issued | PDF | Compressed PDF | Errata |
|---|---|---|---|---|---|
| ARM9E-S | DDI-0165A | Dec 1999 | 2.2MB PDF | 862KB Zip | 28KB |
| ARM966E-S | DDI-0164A | Dec 1999 | 2.3MB PDF | 1.7MB Zip | |
| ARM9TDMI (Rev3) | DDI-0180A | Mar 2000 | 921KB PDF | | 12KB |
| ARM920T (Rev 0) | DDI-0150A | Jun 1999 | 3.23MB PDF | 2.39MB Zip | |
| ARM940T (Rev 1) | DDI-0144A | Feb 1999 | 1.24MB PDF | | 53KB |

EXHIBIT C

### ARM7 Thumb Family

| | | | | | |
|---|---|---|---|---|---|
| ARM7TDMI-S | DDI-0084E | Apr 1999 | 2.18MB PDF | | |
| ARM7TDMI | DDI-0029E | Aug 1995 | download options | | |
| ARM710T | DDI-0086B | Jul 1998 | 1.5MB PDF | 798KB Zip | 14KB |
| ARM720T | DDI-0087E | Jul 1998 | 1.8MB PDF | 859KB Zip | 46KB |
| ARM740T | DDI-0008E | Feb 1998 | 1,561KB PDF | 808KB Zip | 37KB |

**ARM7 Datasheets**

| | # | issued | PDF | Note |
|---|---|---|---|---|
| ARM7 | DDI-0020C | Dec 1994 | 365KB PDF | |
| ARM7100 | DDI-0035A | Jan 1996 | download options | Preliminary |
| ARM7500 | DDI-0050C | Oct 1995 | download options | |
| ARM7500FE | DDI-0077B | Sep 1996 | download options | |

**Embedded Trace Macrocells**

| | | |
|---|---|---|
| ETM Spec (Rev0/0a) | IHI-0014 C issued Dec 1999 | 678KB |
| ARM9 ETM9 (Rev0/0a) | DDI-0157 B issued Mar 2000 | 457KB |
| ARM7 ETM7 (Rev0) | DDI-0158 A issued Feb 2000 | 415KB |

**ARM PrimeCell Peripherals**

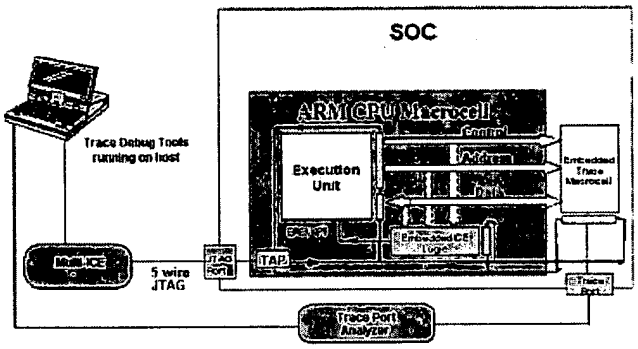
| | | |
|---|---|---|
| Audio Codec Interface [PL040] | DDI-0146 B issued May 1999 | 415KB |
| DC to DC Converter Interface [PL160] | DDI-0147 C issued May 1999 | 329KB |
| General Purpose Input/Output [PL060] | DDI-0142 B issued May 1999 | 293KB |
| Generic IR Interface [PL140] | DDI-0149 B issued May 1999 | 476KB |
| Keyboard/mouse Interface [PL050] | DDI-0143 B issued May 1999 | 398KB |
| Real Time Clock [PL030] | DDI-0140 B issued May 1999 | 356KB |
| Smartcard Interface [PL130] | DDI-0148 B issued May 1999 | 750KB |
| Synchronous Serial Port [PL020] | DDI-0141 C issued May 1999 | 474KB |
| UART + IrDA SIR [PL010] | DDI-0139 B issued May 1999 | 458KB |

*For more information please contact us.*

# Real Time Debug

## Overview

**Real Time Debug (RTD) further enhances ARM's excellent debug capability with the following new features:**




- An historical trace of instruction flow and data accesses
- Collection of trace information about a complex trigger point
- A synthesizable trace macrocell configurable to match user requirements
- Breakpoint or step code in ROM and RAM whilst interrupts are serviced
- Read or write memory without stopping the application
- Real time monitor with small footprint and low latency.

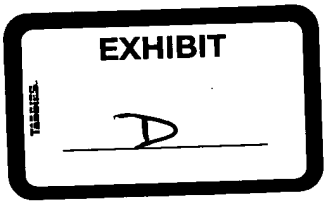
ARM has improved its debug solution to meet the following needs:

- To support the increased level of integration and speed of ASICs. Existing methods of debugging, for example In-Circuit Emulators and Logic Analyzers, are reaching physical limits and can no longer provide the required debug capabilities without on-chip debug support
- To provide software engineers with the ability to review processor activity around an unpredictable event
- For real-time market areas, for example in hard disc drive and automotive applications, where trace and changing memory values, without stopping the processor, are an absolute necessity

ARM's Real Time Debug solution is delivered by two new products:

- Real Time Trace (RTT)
- Real Time Monitor (RTM).

## Resources:



- Technical Reference Manuals for Embedded Trace Macrocell (Feb 2000).

**White Paper - Real Time Debug for System-on-Chip Devices in PDF format (18Kb).**

**For more information please refer to the downloadable flyer in PDF format (257Kb).**

*For more information please contact us.*